

in the treatment of wounds in the British Army, with Col. C. J. Bond, C.M.G., of Leicester, and it occurred to both of us that, if an opportunity could be found, it would be well worth while to experiment with acriflavine in connection with the Isle of Wight disease.

On July 6 I obtained an apparently healthy swarm of bees, which was at once successfully hived at the Leicester Museum. On July 11 numbers of the bees were seen crawling on the grass in front of the hive, and a batch had congregated on one of the legs. Previous to this the bees had been noticed to be slow in taking wing from the alighting board and to have a distended look. On July 16 I had a visit from Mr. S. Jordan, of 25 Longfield Road, Bristol, a well-known bee expert of many years' standing. We went to the hive and carefully examined the stock, and Mr. Jordan expressed his conviction that the bees were suffering from Isle of Wight disease, pointing to the "crawlers," the brown excrement which he squeezed from their distended bodies, and the dislocated wings of many as symptoms confirmatory of an opinion based on a lifetime's experience. Having already obtained some acriflavine, through Col. C. J. Bond, from Dr. C. H. Browning, director of the Bland-Sutton Institute of Pathology, Middlesex Hospital, W., I at once placed a feeder on the top of the brood box, containing a pound of honey to which had been added forty cubic centimetres of a solution of acriflavine (strength 1 in 1000, i.e. one gram of acriflavine to a thousand cubic centimetres of water). In addition to this, I sprayed the bees, over the top of the frames, with a quantity of the acriflavine solution (1 in 1000) until most of the bees were distinctly wet. The next day the bees appeared much livelier and more alert than at any time since their arrival, but during the subsequent week crawlers appeared from time to time. They were, however, much more active than those previously seen, and were generally engaged in vigorously working their abdomens and rubbing their sides with their hind-legs. I was glad to notice that the bees were taking the acriflavine-honey down quite freely from the feeder, which I continually replenished, and gradually the crawling symptoms disappeared.

On opening the hive in the latter part of August I found the colony much reduced in numbers, but looking beautifully clean and healthy, with a quantity of acriflavine-honey stored in the brood frames. This was very obvious, owing to the greenish fluorescent tinge which acriflavine imparts to mixtures. There were no signs of crawling, but the small size of the colony led me to think that most of the crawlers had probably not been cured but had died off, the inference being that the acriflavine had prevented the infection from spreading to the young bees which had taken their place. I am inclined to think that if I had mixed a little honey with the spraying solution of acriflavine I should have possibly saved the diseased members of the hive, because they would have taken in the solution much more readily. This is a point calling for further trial.

During the course of my experiments I tried feeding the bees with a syrup made from cane-sugar, to which acriflavine solution (1 in 1000) had been added, at the rate of twenty cubic centimetres of solution to each pound of syrup. The bees, however, refused to take this mixture, and I had to return to honey. Latterly, since the advent of colder weather, the bees have refused to take down even honey when acriflavine was mixed with it to the above strength, and I am forced to conclude that it is only during that part of the year when they are fairly active that they will take the acriflavine from a feeder. This is confirmed by Mr. J. Waterfield, of Kibworth, to whom I gave a supply of acriflavine solution for the purpose of experiments

upon his own bees. They, like mine, refused to take down the solution, although supplied in honey.

I have given out several supplies of acriflavine solution to beekeepers whose stocks have been attacked by the disease, within the last three or four weeks, but owing to the lateness of the season there have been no visible effects to report, and although I consider my own results distinctly encouraging, I should not have ventured to mention acriflavine at this stage but for Mr. Smith's advertisement. It now seems important to have all possible information regarding it, and I hope Mr. Smith will publish his experiences, which would appear to be more extensive than mine.

Turning to the question of the cause of the Isle of Wight disease, I have been quite unable to detect any trace of the Protozoan parasite *Nosema apis* in any of the diseased bees which I have examined. I have submitted dozens from the infected hive at the museum to a very careful microscopic examination, and have also examined specimens from three other localities in Leicestershire, all of them "crawlers" from hives showing all the ordinary symptoms of Isle of Wight disease, without finding *N. apis* in a single case. I am, therefore, at present in complete agreement with Messrs. Anderson and Rennie, who state, in an important paper in the Proceedings of the Royal Physical Society of Edinburgh, 1915-16, vol. xx., part 1, pp. 16-61, that, after extensive observations and experiments, they are "unable to recognise any causal relation between the presence of this parasite and the disease."

In all the specimens I have examined, bacteria were abundant in the contents of the rectum, and it is difficult to resist the impression that the trouble may be due directly or indirectly to these organisms, although the statement is made by Dr. Malden, in the Board of Agriculture's second report on the Isle of Wight disease, in July, 1913, that "investigations have failed to reveal any species of bacteria constantly associated with the symptoms of the Isle of Wight disease."

As a beginner in beekeeping and a new worker in the field, I am impressed by the need for much further investigation as to the cause and cure of this troublesome disease. I hope, however, that in view of the good results which have been claimed for bacterol, and the possibilities presented by acriflavine, beekeepers may take courage and face whatever risk may be involved in beekeeping, as a national duty in these days of sugar shortage.

It should be mentioned that my work is being carried out under the auspices of the Museum and Libraries Committee of the Leicester Corporation, which has provided me with every facility. On its behalf I should be glad to supply, free of charge, sufficient acriflavine for a good trial to any beekeeper having the disease among his stocks who will apply to me at the Leicester Museum, and undertake to send me an account of the result.

E. E. LOWE.

The Museum, Leicester, October 16.

Tidal Energy Dissipation.

IN regard to my estimate of viscous dissipation of oceanic energy in its bearing on the slowing of the earth's rotation (Proc. Roy. Soc., A, 93, p. 348), I quite assent to Mr. Jeffreys's position (NATURE, vol. xcix., p. 405, July 19, 1917) that it is still open to doubt whether the viscosity of the ocean causes a very appreciable part of the earth's retardation. The formula for calculating the rate of dissipation of internal energy by viscosity, in the absence of disturbing forces, from a knowledge of the surface currents alone, is not challenged. But, irrespective of his argument, this

internal energy, especially that associated with the longer-period motions, will be in part energy of currents arising from temperature differences, and therefore supplied by the solar heat and not by the energy of the earth's rotation. The contribution from the shallower parts of the ocean may have more chance of falling under the latter head. In any case, the whole question can be discussed only when more is known as to the distribution of the oceanic currents. At present the only motion known at a considerable distance from land is the residual drift, and this only in a few places, chiefly where it exceeds one knot. But as this does not change with the tide, its energy is of thermal origin.

It is more difficult to agree with Mr. Jeffreys's contention that viscous action in a solid earth cannot be an appreciable cause of the slowing of its rotation. By using a special law of viscosity quoted by him (M.N. Roy. Astron. Soc., vol. lxxvii., p. 449) as suggested amongst other possibilities by Sir J. Larmor as a reasonable alternative to the Maxwell-Darwin law used by him previously (M.N. Roy. Astron. Soc., vol. lxxv., p. 648), he himself has considerably modified his previous views. But a wide field of choice is open, of which this is one example. Thus the law might be that the ratio of the stress to strain is $n + f(d/dt)$, where f is any function. In order to give the required values of the earth's retardation and of the Eulerian nutation, the function f is defined for only two values of the argument, and so is to a great extent arbitrary. Evidently suitable forms may be chosen in very many different ways, so as, in addition, to allow for the properties of earthquake waves.

R. O. STREET.

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Stereo-Radioscopes.

WE have read with interest in the Notes columns of NATURE of October 18 a description of what is called a stereo-radioscope, said to be invented by one Major Lièvre. What interests us so much is the fact that Sir J. Mackenzie-Davidson invented the same thing no fewer than twelve years ago. The instrument was made by our firm and put on the market for several years. As the two sources of rays have to be about 6 cm. apart, the only practical method was found to be to build a special X-ray tube with two anti-cathodes in the same bulb.

The apparatus was exactly the thing described in your paragraph. A motor drove an interrupter having two contact blades opposite each other, exciting the two sides of the tube alternately and driving a stroboscopic shutter synchronously with the interrupter.

The great objection to the instrument is that the operator must look into the view-box in front of the shutter, thus fixing his position with regard to the large and heavy instrument. Either this latter or the patient must be adjusted to obtain the proper view.

The difficulty of this is obvious, and results in an expensive and cumbersome apparatus.

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An Optical Phenomenon.

CAPT. C. J. P. CAVE's letter in NATURE of October 18 reminds me of a similar effect experienced when travelling in a *coupé* compartment at the rear of a train some years ago. From a window at the back of the *coupé* one could watch the ever-disappearing landscape as the train travelled along. The impression created was that every object seen appeared to be

rushing away from the train. But a stranger sensation occurred when turning my eyes from the window to objects in the *coupé*, for, during a space of a few seconds, they appeared to be moving rapidly in a contrary direction.

C. CARUS-WILSON.

October 19.

THE effect described by Capt. Cave in NATURE of October 18 can be observed after walking rapidly along the top of a wall and keeping the eyes fixed on the road. On stopping, still looking at the road, part of the field of view seems to be slipping away backwards.

H. M. ATKINSON.

45 Denman Drive, N.W., October 19.

INFANT AND CHILD MORTALITY.

POLITICAL economists are generally agreed that, if a country is to be prosperous and to maintain its place among the nations, its population must substantially and progressively increase. Two cardinal factors are essential to ensure a satisfactory increase of population: (1) a birth-rate maintained at a proper level, and (2) a death-rate not excessive. A falling birth-rate and an excessive mortality are both national calamities; indeed, it may be questioned if France would be quite in her present position had her birth-rate equalled that of Germany. In France the birth-rate, already abnormally low, fell from 23.5 per 1000 in 1887 to 19.0 in 1914, while for Germany for the same years the figures were respectively 36.9 and 28.3, with the result that during this period the population of France only increased from about 38½ millions to 40 millions, whereas that of Germany increased from 49 millions to 65 millions.

We are in a similar parlous state as regards our birth-rate, for this has been steadily declining from 36.3 in 1876 to 23.0 or thereabouts in 1916 per 1000 of population. The effect of this has been that our increase of population for 1914 was less by nearly half a million than it would have been had the birth-rate obtaining in 1876 been maintained. Fortunately, our mortality-rate is one of the lowest in the world, and this, together with a considerable saving of infant and child lives, has enabled us to show a substantial increase of population. We are, nevertheless, still faced with a low and apparently falling birth-rate (for the County of London the birth-rate was 21.5 for 1916, against 22.5 for 1915), and we must, moreover, take into account the serious losses among the adult male population, the potential and prospective fathers of children, owing to the present war. It does not, therefore, appear that any substantial increase in the birth-rate can at present be anticipated.

We are, then, more than ever dependent upon a diminution of mortality if our increase of population is to be maintained. But with a death-rate among the whole civil population of 14.7 per 1000 (1916), we can scarcely expect any considerable diminution in the general mortality. Is there any section of the community among whom the mortality is excessive and might be reduced? An analysis.